

Epidemiologic Surveillance

Annual Summary for
Hanford Site



Prepared by the Epidemiologic
Surveillance Data Center, a joint program
of the University of Washington and the
Fred Hutchinson Cancer Research Center

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This annual report is sponsored by the U.S. Department of Energy. It is based on information submitted by participating laboratories. The views and opinions expressed in this report are those of its authors and do not necessarily reflect the views of the United States Government, its agencies, or its employees.

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Introduction

Epidemiologic surveillance at U.S. Department of Energy (DOE) facilities consists of regular and systematic collection, analysis, and interpretation of data on absences due to illness and injury in the work force. Its purpose is to provide an early warning system of health problems occurring among employees at participating sites. Data are collected by coordinators at each site and submitted to the Epidemiologic Surveillance Data Center, located at the University of Washington, where quality control procedures and analyses are carried out. Rates of absences and rates of diagnoses associated with absences are analyzed by occupation and other relevant variables. They may be compared with the disease experience of different groups within the DOE work force and with populations who do not work for DOE to identify disease patterns or clusters that may be associated with work activities. In the future, the results of epidemiologic surveillance will be combined with those of medical surveillance and exposure surveillance to form an integrated approach to worker health protection.

In this annual report, the 1992 morbidity data for the Hanford Environmental Health Foundation are summarized. These analyses focus on absences of 5 or more consecutive days occurring among workers aged 16-69 years. They are arranged into six sets of tables which present: (1) the distribution of the labor force by occupational category and pay status; (2) the absences per person, diagnoses per absence and diagnosis rates for the work force as a whole; (3) diagnosis rates by type of disease or injury; (4) diagnosis rates by occupational category; (5) relative risk for specific types of diseases or injury by occupational category; and (6) deaths occurring among active workers. All rates presented in this report are age-adjusted (see glossary) and represent the number of diagnoses reported per 1,000 persons in 1 year.

The data included in this report are supplemental to, but do not replace, those reported in other safety, industrial hygiene, and health physics reports prepared by DOE. They are based on absences reported by the sites. There has been no attempt to validate diagnoses with medical records, pathology, or other laboratory reports. Similarly, there has been no attempt to validate occupational information reported by the site. For reporting purposes, occupational titles have been grouped into broad categories within which a great deal of diversity in tasks and exposures is likely to exist.

Overview

The Hanford site occupies 560 square miles of semi-arid desert in southeastern Washington State. It was chosen for the Manhattan Project in 1943 to produce plutonium for the world's first nuclear weapons. Today the primary mission is cleanup and environmental restoration. Other activities include scientific and environmental research; development and application of radioactive and hazardous waste management technology; and the design, construction, and operation of energy-related test and development facilities. As a reflection of its changing mission, in 1991 management responsibility for the Hanford Site was transferred from the Office of Defense Programs to the Office of Environmental Restoration and Waste Management. Richland Operations Office provides local oversight and program management for the four prime contractors.

Labor Force by Occupational Category, 1992

During 1992, there were 15,688 employees aged 16-69 identified by Hanford as participants in epidemiologic surveillance. The composition of the work force by occupational category and by salary status is given in Table 1. The occupational categories with the largest number of employees were administration (32%), professional (27%), and technical (15%). Approximately 65% of white collar workers were salaried, compared with 14% of blue collar workers.

Table 1. Labor Force by Occupational Category

	Occupational Category	Number of Employees
White Collar	Administration	5,015
	Salaried	2,510
	Hourly	2,505
	Professional	4,259
	Salaried	3,993
	Hourly	266
	Technical	2,423
	Salaried	1,092
	Hourly	1,331
	Subtotal	11,697
Blue Collar	Service	1,038
	Salaried	185
	Hourly	853
	Craftsmen and Manual Laborers	1,349
	Salaried	151
	Hourly	1,198
	Nuclear	1,049
	Salaried	210
	Hourly	839
	Other	555
	Salaried	259
Hourly	296	
	Subtotal	3,991
	Total Number of Employees	15,688

Absences Among Work Force, 1992

Absences Per Person

In 1992, 1,488 of Hanford's employees (10%) had at least one absence of 5 or more continuous work days because of illness or injury (Table 2.A). Fourteen percent of these workers had two or more absences, resulting in 1,738 total absences. Women, who comprised 33% of Hanford's work force, contributed approximately half of all reported absences. Approximately 18% of women's absences were attributed to pregnancy-related events.

Table 2.A. Absences Per Person

Employee Categories	Number of Workers	Number of Absences (%)					Total Persons Absent at Least Once	Total Number of Absences
		0	1	2	3	4+		
Male	10,572	9,807 (92.8)	665 (6.3)	90 (0.9)	10 (0.1)	0 (0.0)	765	875
Female	5,116	4,393 (85.9)	614 (12.0)	85 (1.7)	18 (0.4)	6 (0.1)	723	863
TOTAL	15,688	14,200 (90.5)	1,279 (8.2)	175 (1.1)	28 (0.2)	6 (0.1)	1,488	1,738

Diagnoses Per Absence

A total of 1,985 diagnoses associated with 1,738 absences of 5 or more days were reported to the Epidemiologic Surveillance Data Center (Table 2.B). Multiple diagnoses were reported for 213 of the absences (12%).

Table 2.B. Diagnoses Per Absence

Employee Categories	Number of Diagnoses per Absence					Total Number of Absences	Total Number of Diagnoses
	1	2	3	4	5		
Male	775	91	8	1	0	875	985
Female	750	95	15	0	3	863	1,000
TOTAL	1,525	186	23	1	3	1,738	1,985

Rate of Diagnoses

During 1992, 1,985 diagnoses noted for absences of 5 or more consecutive work days yielded an age-adjusted rate of 126.7 diagnoses per 1,000 workers (Table 2.C). The rate of diagnoses among women was more than twice the rate among men (197.5 versus 88.1 per 1,000 persons). Removing pregnancy-related diagnoses from analyses reduced the diagnosis rate among women to 168.3 per 1,000 persons.

Table 2.C. Rate of Diagnoses

Employee Categories	Number of Workers	Number of Diagnoses*	Crude Rate per 1,000	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Male	10,572	985	93.2	88.1	82.2	94.3
Female	5,116	1,000	195.5	197.5	184.9	211.1
TOTAL	15,688	1,985	126.5	126.7	120.9	132.8

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Diseases and Injuries by Diagnostic Category, 1992

The age-adjusted diagnosis rates for each diagnostic category are given for all workers and separately for each gender (Tables 3-5). Table 6 describes diagnoses associated with pregnancy, delivery, and conditions of the newborn. As Table 3 shows, the three diagnostic categories with the highest rates were external cause of injury (24.0 per 1,000), respiratory system (23.0 per 1,000), and pregnancy and childbirth (12.5 per 1,000). Together these three categories comprise nearly 50% of all diagnoses. Because the patterns of diagnoses reported by men and women differ, Tables 4 and 5, which show the diagnosis rates separately by gender, provide a better description of disease and injury patterns in the work force.

Among men the leading diagnostic category, based on age-adjusted rates, was external causes of injury with 221 men reporting 241 diagnoses. This accounted for 24% of all diagnoses. Eighty-one injuries were related to overexertion and strenuous movements, 53 were due to falls, 29 were related to transportation accidents, and 40 injuries—17% of all injuries—were unspecified as to the cause of the injury. The second most common diagnosis group associated with an absence among men was respiratory system problems with 195 men reporting 211 diagnoses. Forty-six percent of these diagnoses were related to pneumonia or bronchitis, and 43% were due to upper respiratory problems. Disorders of the circulatory system ranked third with 72 men reporting 112 diagnoses. Ischemic disease accounted for 22% of this category and acute myocardial infarction accounted for 14%. The fourth leading category was the digestive system with 93 men reporting 102 diagnoses. Of these diagnoses, 33% were attributed to hernias and gallbladder disease and 8% to appendicitis. The nervous system, with 59 men reporting 67 diagnoses, and musculoskeletal disorders, with 67 men reporting 72 diagnoses, were the next most common diagnosis groups among men. More than 55% of the musculoskeletal diagnoses were dorsopathies (spinal disorders). Among the 35 men who reported 35 infectious disease diagnoses, there were nine reports of chicken pox and seven of gastroenteritis. Twenty-five diagnoses related to malignancy were reported by 20 men in 1992. Among these men, there were three cases each of lymphoma and prostate cancer, two cases of tongue cancer, and one case each of leukemia and cancer of the oropharynx, lung, connective tissue, bladder, brain, colon, kidney, skin, and nasopharynx. There were two cancers of unknown or ill-defined site.

Among women the leading diagnostic category, based on age-adjusted rates, was the respiratory system with 146 women reporting 164 diagnoses. Forty-one percent of these diagnoses were related to upper respiratory illnesses, and 41% were due to pneumonia or bronchitis. The second most common diagnosis group associated with an absence among women was external cause of injury with 129 women reporting 156 diagnoses. Fifty-one diagnoses were related to accidental falls, 48 to overexertion and strenuous movement, 22 to transport accidents, and 12 injuries were related to late effects of accidental injuries. Diagnoses related to pregnancy and childbirth ranked third, with 149 women reporting 157 diagnoses. This category, along with conditions of the newborn, is discussed on page 12. The fourth leading diagnosis group was disorders of the genitourinary system with 78 women reporting 103 diagnoses. More than 16% of these diagnoses were associated with

endometriosis, 14% with genital pain or bleeding, and 8% with ovarian cysts. The next leading diagnosis category was the digestive system with 78 women reporting 85 diagnoses. Gallbladder disorders were the most common followed by inflammatory bowel disease, teeth or jaw problems, and hernias. Fifty-one women reported 60 diagnoses related to infectious diseases of which 22 diagnoses were of unspecified sites, nine streptococcal sore throats, and six chicken pox cases. Forty-seven women reported 50 nervous system disorders, and 41 women reported 48 musculoskeletal system diagnoses. Thirty-one percent of musculoskeletal system diagnoses were dorsopathies. Twenty-eight diagnoses related to malignancy were reported by 24 women in 1992. Among these women, there were 12 breast cancers, two lymphomas, two cervical cancers (of which one was in situ), and one report each of cancer of the colon, brain, rectum, thyroid, uterus, and lymphosarcoma. There were two cancers of unspecified or ill-defined site.

The age-adjusted diagnosis rate for women was higher than for men in 14 of the 15 major diagnostic categories not related to pregnancy. Men had higher rates of diagnoses for circulatory system problems.

Table 3. Diseases and Injuries by Diagnostic Category - Males and Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	95	6.5	5.3	8.1
Malignant neoplasms	140-208, 230-234	53	3.5	2.7	4.7
Digestive organs	150-159	3	0.2	0.1	0.6
Respiratory system	160-165	3	0.1	0.0	0.5
Breast	174-175	15	0.9	0.6	1.6
Genitourinary	179-185	6	0.5	0.2	1.1
Nervous system	191-192	2	0.1	0.0	0.5
Leukemia, lymphoma	200-208	8	0.6	0.3	1.3
Benign neoplasms & other	210-229, 235-239	42	2.6	1.9	3.6
Endocrine & metabolic diseases	240-279	38	2.2	1.5	3.0
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	60	3.4	2.6	4.5
Alcoholism	303	10	0.6	0.3	1.1
Drug abuse	304-305	1	0.0	0.0	0.3
Nervous system & sense organs	320-389	117	7.5	6.2	9.1
Circulatory system	390-459	133	8.8	7.4	10.5
Acute myocardial infarction	410	17	1.1	0.7	1.9
Ischemic disease, not M.I.	411-414	30	2.1	1.5	3.0
Cerebrovascular disease	430-438	5	0.3	0.1	0.7
Respiratory system	460-519	375	23.0	20.7	25.6
Upper respiratory	460-465, 470-478	158	9.8	8.3	11.6
Pneumonia/bronchitis	466, 480-487	165	10.0	8.5	11.8
Chronic respiratory conditions	490-496	44	2.7	2.0	3.7
Digestive system	520-579	187	11.5	9.8	13.3
Hernias	550-553	38	2.2	1.6	3.1
Gall bladder disease	574-575	51	3.1	2.3	4.1
Genitourinary system	580-629	125	7.7	6.4	9.3
Benign prostatic hypertrophy	600	2	0.1	0.0	0.5
Endometriosis	617	17	1.0	0.6	1.6
Ovarian cysts	620.0-620.2	8	0.6	0.3	1.2
Female genital pain/bleeding	625-626	14	0.7	0.4	1.3
Pregnancy & childbirth	630-676	157	12.5	10.6	14.8
Skin & subcutaneous tissue	680-709	32	2.2	1.5	3.1
Musculoskeletal system	710-739	120	7.5	6.2	9.0
Dorsopathies	720-724	55	3.3	2.5	4.4
Congenital anomalies**	740-759	3	0.3	0.1	1.0
Conditions in perinatal period**	760-779	5	0.3	0.1	0.7
Symptoms, signs & ill-defined cond.	780-799	46	3.2	2.4	4.3
External causes of injury	E800-999	397	24.0	21.6	26.6
Transport accidents	E800-849	51	3.2	2.4	4.4
Medical accidents	E870-879	6	0.4	0.2	1.0
Accidental falls	E880-888	104	6.5	5.3	8.0
Accidents-struck by objects	E916-918	20	1.1	0.7	1.7
Accidents-machinery	E919	1	0.0	0.0	0.3
Total minus pregnancies		1,820	113.6	108.2	9.2
TOTAL		1,985	126.7	120.9	2.8

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

Table 4. Diseases and Injuries by Diagnostic Category - Males

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	35	3.4	2.3	4.9
Malignant neoplasms	140-208, 230-234	25	2.3	1.6	3.5
Digestive organs	150-159	1	0.1	0.0	0.7
Respiratory system	160-165	3	0.2	0.1	0.7
Breast	174-175	0	0.0	0.0	0.0
Genitourinary	179-185	4	0.5	0.2	1.2
Nervous system	191-192	1	0.1	0.0	0.7
Leukemia, lymphoma	200-208	4	0.4	0.1	1.1
Benign neoplasms & other	210-229, 235-239	9	0.9	0.4	1.9
Endocrine & metabolic diseases	240-279	15	1.3	0.7	2.1
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	27	2.2	1.5	3.3
Alcoholism	303	9	0.7	0.3	1.3
Drug abuse	304-305	1	0.1	0.0	0.5
Nervous system & sense organs	320-389	67	6.5	5.0	8.4
Circulatory system	390-459	112	10.0	8.3	12.1
Acute myocardial infarction	410	16	1.5	0.9	2.4
Ischemic disease, not M.I.	411-414	25	2.3	1.5	3.4
Cerebrovascular disease	430-438	4	0.3	0.1	0.9
Respiratory system	460-519	211	18.1	15.6	21.0
Upper respiratory	460-465, 470-478	90	7.4	5.9	9.3
Pneumonia/bronchitis	466, 480-487	97	8.4	6.8	10.5
Chronic respiratory conditions	490-496	19	1.8	1.1	3.0
Digestive system	520-579	102	9.3	7.5	11.5
Hernias	550-553	31	2.6	1.8	3.8
Gall bladder disease	574-575	13	1.3	0.7	2.4
Genitourinary system	580-629	22	1.8	1.2	2.9
Benign prostatic hypertrophy	600	2	0.2	0.0	0.7
Endometriosis	617	N/A	N/A	N/A	N/A
Ovarian cysts	620.0-620.2	N/A	N/A	N/A	N/A
Female genital pain/bleeding	625-626	N/A	N/A	N/A	N/A
Pregnancy & childbirth	630-676	N/A	N/A	N/A	N/A
Skin & subcutaneous tissue	680-709	23	2.1	1.3	3.2
Musculoskeletal system	710-739	72	6.3	4.9	8.1
Dorsopathies	720-724	40	3.6	2.6	5.1
Congenital anomalies	740-759	N/A	N/A	N/A	N/A
Conditions in perinatal period	760-779	N/A	N/A	N/A	N/A
Symptoms, signs & ill-defined cond.	780-799	24	2.4	1.6	3.8
External causes of injury	E800-999	241	21.6	18.7	24.9
Transport accidents	E800-849	29	2.8	1.8	4.3
Medical accidents	E870-879	2	0.3	0.1	1.4
Accidental falls	E880-888	53	5.0	3.7	6.8
Accidents-struck by objects	E916-918	15	1.2	0.7	2.2
Accidents-machinery	E919	1	0.1	0.0	0.5
Total minus pregnancies		N/A	N/A	N/A	N/A
TOTAL		985	88.1	82.2	94.3

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

Table 5. Diseases and Injuries by Diagnostic Category - Females

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Infections & parasitic diseases	001-139	60	12.4	9.4	16.2
Malignant neoplasms	140-208, 230-234	28	6.2	4.2	9.3
Digestive organs	150-159	2	0.5	0.1	1.9
Respiratory system	160-165	0	0.0	0.0	0.0
Breast	174-175	15	3.6	2.1	6.3
Genitourinary	179-185	2	0.4	0.1	1.8
Nervous system	191-192	1	0.1	0.0	1.0
Leukemia, lymphoma	200-208	4	0.9	0.3	2.4
Benign neoplasms & other	210-229, 235-239	33	6.3	4.4	9.0
Endocrine & metabolic diseases	240-279	23	4.2	2.7	6.5
Blood & blood-forming organs	280-289	0	0.0	0.0	0.0
Mental disorders	290-319	33	5.8	4.0	8.4
Alcoholism	303	1	0.2	0.0	1.5
Drug abuse	304-305	0	0.0	0.0	0.0
Nervous system & sense organs	320-389	50	10.6	7.8	14.4
Circulatory system	390-459	21	6.1	3.8	9.7
Acute myocardial infarction	410	1	0.2	0.0	1.2
Ischemic disease, not M.I.	411-414	5	2.2	0.9	5.3
Cerebrovascular disease	430-438	1	0.2	0.0	1.2
Respiratory system	460-519	164	33.4	28.3	39.4
Upper respiratory	460-465, 470-478	68	13.8	10.7	17.8
Pneumonia/bronchitis	466, 480-487	68	13.8	10.7	17.8
Chronic respiratory conditions	490-496	25	5.2	3.4	8.0
Digestive system	520-579	85	16.8	13.4	21.1
Hernias	550-553	7	1.5	0.7	3.2
Gall bladder disease	574-575	38	7.2	5.1	10.1
Genitourinary system	580-629	103	19.2	15.7	23.5
Benign prostatic hypertrophy	600	N/A	N/A	N/A	N/A
Endometriosis	617	17	2.8	1.7	4.5
Ovarian cysts	620.0-620.2	8	1.4	0.7	2.9
Female genital pain/bleeding	625-626	14	2.3	1.4	4.0
Pregnancy & childbirth	630-676	157	27.9	23.8	32.7
Skin & subcutaneous tissue	680-709	9	2.2	1.0	4.5
Musculoskeletal system	710-739	48	10.8	8.0	14.6
Dorsopathies	720-724	15	3.2	1.8	5.5
Congenital anomalies**	740-759	3	0.6	0.2	2.0
Conditions in perinatal period**	760-779	5	0.8	0.3	1.8
Symptoms, signs & ill-defined cond.	780-799	22	4.6	2.9	7.1
External causes of injury	E800-999	156	29.8	25.2	35.1
Transport accidents	E800-849	22	4.1	2.7	6.3
Medical accidents	E870-879	4	0.9	0.3	2.5
Accidental falls	E880-888	51	10.3	7.6	13.9
Accidents-struck by objects	E916-918	5	0.9	0.4	2.2
Accidents-machinery	E919	0	0.0	0.0	0.0
Total minus pregnancies		835	168.3	156.5	181.0
TOTAL		1,000	197.5	184.9	211.1

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

**Occurring in infants born to female employees.

During 1992, 149 women reported 165 diagnoses related to pregnancy and conditions of newborn; of these, 78 were normal deliveries (Table 6). Under complications of pregnancy, 35 women reported 36 diagnoses. The major diagnosis groups in this category included early or threatened labor (10), hypertension (6), miscarriage (5), excessive vomiting (5), and ectopic pregnancy (5). Under complications of labor and delivery, 39 women reported 43 diagnoses. Malposition and malpresentation of the fetus (8) was the major diagnosis group in this category followed by cesarean delivery without mention of reason (7). There were three newborns with congenital malformations and five newborns with perinatal complications.

Table 6. Diseases Associated with Pregnancy, Delivery, and Conditions of Newborn

Category of Diagnoses	ICD9-CM Code	Number of Diagnoses†	Age-Adjusted Rate per 1,000*	Lower 95% Confidence Limit per 1,000	Upper 95% Confidence Limit per 1,000
Complications of pregnancy	630-648	36	6.4	4.6	8.9
Normal delivery	650	78	14.0	11.2	17.6
Complications of labor/delivery/puerperium‡	651-676	43	7.5	5.5	10.2
Congenital anomalies**	740-759	3	0.6	0.2	2.0
Conditions in perinatal period**	760-779	5	0.8	0.3	1.8
TOTAL		165	29.3	25.0	34.2

†Includes all diagnoses reported with an absence of 5 or more days.

*Standardized to age distribution of 1970 U.S. population.

‡Includes delivery by cesarean section and multiple births.

**Occurring in infants born to female employees.

Diagnoses by Occupational Category, 1992

During 1992, the age-adjusted diagnosis rate for all employees was higher among blue collar workers than white collar workers (172.6 versus 111.3 per 1,000 persons) (Table 7). Service workers, who comprised 7% of the work force, had the highest diagnosis rate (238.2 per 1,000 persons) with 187 people reporting 249 diagnoses. The second highest diagnosis rate was among nuclear workers with 151 people reporting 198 diagnoses (183.9 per 1,000 persons). Craftsman and manual laborers ranked third with 166 workers reporting 226 diagnoses (154.0 per 1,000 persons) and technical workers followed with 274 people reporting 361 diagnoses (153.0 per 1,000 persons).

Among men, the diagnosis rate for blue collar workers was more than twice that of white collar workers (144.4 versus 63.0 per 1,000) (Table 8). Service workers had the highest diagnosis rate with 131 men reporting 164 diagnoses (183.4 per 1,000 persons). Craftsmen and manual laborers followed with 158 men reporting 209 diagnoses (139.7 per 1,000 persons), and nuclear workers ranked third with 92 men reporting 116 diagnoses (133.4 per 1,000 persons). Technical workers ranked fourth with 138 men reporting 174 diagnoses (100.4 per 1,000 persons).

Among women, blue collar workers had a higher diagnosis rate (299.9 per 1,000) than white collar workers (182.7 per 1,000) (Table 9). The highest diagnosis rate was among service workers with 56 women reporting 85 diagnoses (504.3 per 1,000). Nuclear workers followed with 59 women reporting 82 diagnoses (385.9 per 1,000), and craftsman and manual laborers ranked third with 8 women reporting 17 diagnoses (320.1 per 1,000).

Table 7. Diagnoses by Occupational Category - Males and Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	5,015	667	136.4	125.8	147.9
	Professional	4,259	245	54.4	47.6	62.2
	Technical	2,423	361	153.0	137.2	170.5
	Subtotal	11,697	1,273	111.3	105.0	118.0
Blue Collar	Service	1,038	249	238.2	208.0	272.8
	Craftsmen and Manual Laborers	1,349	226	154.0	127.0	186.6
	Nuclear	1,049	198	183.9	156.9	215.5
	Other	555	39	69.4	48.7	98.9
	Subtotal	3,991	712	172.6	159.6	186.7
TOTAL	15,688	1,985	126.7	120.9	132.8	

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Table 8. Diagnoses by Occupational Category - Males

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	1,924	135	68.5	55.5	84.7
	Professional	3,674	179	43.4	37.3	50.6
	Technical	1,711	174	100.4	85.8	117.5
	Subtotal	7,309	488	63.0	57.2	69.5
Blue Collar	Service	851	164	183.4	154.7	217.5
	Craftsmen and Manual Laborers	1,301	209	139.7	114.8	170.1
	Nuclear	856	116	133.4	108.4	164.2
	Other	255	8	28.0	12.9	60.8
	Subtotal	3,263	497	144.4	131.0	159.2
TOTAL	10,572	985	88.1	82.2	94.3	

*Includes all diagnoses reported with an absence of 5 or more days.

**Standardized to age distribution of 1970 U.S. population.

Table 9. Diagnoses by Occupational Category - Females

	Occupational Category	Number of Workers	Number of Diagnoses*	Age-Adjusted Rate per 1,000**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
White Collar	Administration	3,091	532	175.5	160.4	192.1
	Professional	585	66	115.6	87.0	153.5
	Technical	712	187	271.4	232.2	317.3
	Subtotal	4,388	785	182.7	169.5	197.0
Blue Collar	Service	187	85	504.3	398.9	637.6
	Craftsmen and Manual Laborers	48	17	320.1	190.0	539.2
	Nuclear	193	82	385.9	302.3	492.5
	Other	300	31	108.3	72.2	162.4
	Subtotal	728	215	299.9	260.8	344.8
TOTAL	5,116	1,000	197.5	184.9	211.1	

*Includes all diagnoses reported with an absence of 5 or more days, including absences for pregnancy and delivery.

**Standardized to age distribution of 1970 U.S. population.

Relative Risk for Selected Disease Categories by Occupation, 1992

In Tables 10.A through 10.O the risk of one or more absences associated with selected diagnostic categories for specific occupational groups is compared with that of the entire Hanford work force. This comparison takes into account the possible confounding effects of age and gender. In contrast to the previous series of tables, these analyses examine the risk of a worker having **one or more** absences in a diagnostic category during 1992. This was done to minimize the problem associated with one person having multiple absences for the same condition.

The statistical methods used to compare risks of absence are the relative risk and the 95% confidence interval. The relative risk is the rate of an absence in one group divided by the rate in a reference (comparison) group. A relative risk of *1.0* indicates that both groups have the same risk of absence. A relative risk of *2.0* indicates that a group has twice the risk of the reference group, whereas a relative risk of *0.5* implies that a group has one-half the risk of the reference group. The confidence interval represents the range of values for the relative risk that are consistent with the observed data. A 95% confidence interval implies that there is a 95% chance that the true relative risk lies within the interval. If the confidence interval includes the value *1.0* then the observed difference in absence rates is likely to have occurred by chance; in other words, the relative risk is not statistically significant. For example, a relative risk with a confidence interval of *0.8 to 4.4* would not be considered statistically significant, whereas a relative risk with an interval of *1.7 to 4.2* would be considered statistically significant.

Relative to the entire Hanford work force, persons classified as working in service occupations were found to have statistically significant elevated risk of absence associated with infections and parasitic diseases (relative risk [RR] 2.4) (Table 10.A), diseases of the respiratory system (RR 2.3) (Table 10.H), diseases of the genitourinary system (RR 2.3) (Table 10.J), diseases of the skin (RR 3.0) (Table 10.L), diseases of musculoskeletal system (RR 2.7) (Table 10.M), and external causes of injury (RR 3.2) (Table 10.O). Similarly, persons categorized as nuclear workers were at increased risk for diseases of the nervous system (RR 2.1) (Table 10.F), diseases of the respiratory system (RR 2.1) (Table 10.H), pregnancy and childbirth events (RR 2.1) (Table 10.K), and external causes of injury (RR 1.9) (Table 10.O). Workers in technical positions were at increased risk for infections and parasitic diseases (RR 2.0) (Table 10.A) and diseases of the nervous system (RR 1.7) (Table 10.F). Craftsmen and manual laborers were at an increased risk for diseases of the respiratory system (RR 1.8) (Table 10.H) and external causes of injury (RR 2.2) (Table 10.O).

Workers in professional positions had decreased risk for infections (RR 0.4) (Table 10.A), diseases of nervous system (RR 0.3) (Table 10.F), diseases of respiratory system (RR 0.4) (Table 10.H), and external causes of injury (RR 0.4) (Table 10.O). Administrative workers had decreased risk for external causes of injury (RR 0.7) (Table 10.O).

Risk of absences were slightly elevated, although of borderline statistical significance, among technical workers for diseases of the circulatory, respiratory, and digestive systems; among craftsman occupations for infections and diseases of the nervous system; and among service workers for benign neoplasms and diseases of the digestive system. Risk of absences was slightly lower among administrative workers for infections and diseases of the respiratory system as well as among professional workers for diseases of the digestive system; however, these decreases were also of borderline statistical significance.

Table 10.A. Infections and Parasitic Diseases

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	24	0.7	0.4	1.0
Professional	4,259	7	0.4	0.2	0.8
Technical	2,423	25	2.0	1.3	3.0
Service	1,038	11	2.4	1.2	4.5
Craftsmen and Manual Laborers	1,349	9	1.9	1.0	3.9
Nuclear	1,049	6	1.2	0.5	2.9
Other	555	4	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	86	1.0		

Table 10.B. Malignant Neoplasms

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	17	0.9	0.5	1.6
Professional	4,259	11	1.1	0.5	2.2
Technical	2,423	3	0.5	0.2	1.6
Service	1,038	4	1.5	0.5	4.3
Craftsmen and Manual Laborers	1,349	1	0.3	0.0	2.7
Nuclear	1,049	5	2.2	0.9	5.5
Other	555	3	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	44	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.C. Benign Neoplasms and Other

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	23	1.0	0.6	1.7
Professional	4,259	5	0.8	0.3	2.0
Technical	2,423	5	0.9	0.4	2.3
Service	1,038	5	2.6	1.0	6.8
Craftsmen and Manual Laborers	1,349	2	1.5	0.4	5.7
Nuclear	1,049	1	0.6	0.1	4.2
Other	555	0	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	41	1.0		

Table 10.D. Endocrine and Metabolic Diseases

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	17	1.0	0.6	1.9
Professional	4,259	4	0.5	0.2	1.4
Technical	2,423	5	0.9	0.4	2.4
Service	1,038	3	1.6	0.5	5.0
Craftsmen and Manual Laborers	1,349	3	1.4	0.4	5.0
Nuclear	1,049	4	2.0	0.7	5.7
Other	555	0	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	36	1.0		

Table 10.E. Mental Disorders

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	27	1.2	0.7	1.9
Professional	4,259	7	0.6	0.3	1.3
Technical	2,423	10	1.2	0.6	2.4
Service	1,038	4	1.3	0.5	3.8
Craftsmen and Manual Laborers	1,349	3	0.8	0.2	2.8
Nuclear	1,049	4	1.2	0.4	3.5
Other	555	0	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	55	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.F. Diseases of Nervous System and Sense Organs

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	36	0.9	0.6	1.3
Professional	4,259	9	0.3	0.2	0.7
Technical	2,423	26	1.7	1.1	2.5
Service	1,038	7	1.1	0.5	2.3
Craftsmen and Manual Laborers	1,349	14	1.8	1.0	3.2
Nuclear	1,049	13	2.1	1.2	3.8
Other	555	1	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	106	1.0		

Table 10.G. Diseases of Circulatory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	24	1.0	0.6	1.5
Professional	4,259	18	0.7	0.4	1.1
Technical	2,423	19	1.5	0.9	2.4
Service	1,038	6	1.0	0.4	2.3
Craftsmen and Manual Laborers	1,349	14	1.4	0.8	2.5
Nuclear	1,049	7	1.2	0.6	2.7
Other	555	0	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	88	1.0		

Table 10.H. Diseases of Respiratory System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	99	0.8	0.6	1.0
Professional	4,259	34	0.4	0.3	0.6
Technical	2,423	59	1.2	0.9	1.5
Service	1,038	49	2.3	1.7	3.1
Craftsmen and Manual Laborers	1,349	48	1.8	1.3	2.5
Nuclear	1,049	45	2.1	1.6	2.9
Other	555	7	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	341	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.I. Diseases of Digestive System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	58	0.9	0.7	1.2
Professional	4,259	29	0.7	0.5	1.0
Technical	2,423	33	1.3	0.9	1.9
Service	1,038	16	1.5	0.9	2.5
Craftsmen and Manual Laborers	1,349	17	1.4	0.8	2.3
Nuclear	1,049	15	1.4	0.8	2.4
Other	555	3	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	171	1.0		

Table 10.J. Diseases of Genitourinary System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	47	0.9	0.6	1.3
Professional	4,259	10	0.6	0.3	1.2
Technical	2,423	18	1.3	0.8	2.1
Service	1,038	10	2.3	1.2	4.3
Craftsmen and Manual Laborers	1,349	5	1.5	0.6	3.8
Nuclear	1,049	7	1.5	0.7	3.3
Other	555	1	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	98	1.0		

Table 10.K. Pregnancy and Childbirth

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	80	1.0	0.7	1.2
Professional	4,259	17	0.9	0.5	1.5
Technical	2,423	28	1.3	0.9	1.9
Service	1,038	3	0.8	0.3	2.6
Craftsmen and Manual Laborers	1,349	0	0.0	0.0	0.0
Nuclear	1,049	12	2.1	1.2	3.7
Other	555	9	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	149	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.L. Diseases of Skin and Subcutaneous Tissue

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	4	0.4	0.1	1.2
Professional	4,259	3	0.3	0.1	1.1
Technical	2,423	7	1.5	0.7	3.4
Service	1,038	6	3.0	1.2	7.3
Craftsmen and Manual Laborers	1,349	6	1.9	0.8	4.7
Nuclear	1,049	3	1.5	0.4	4.9
Other	555	2	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	31	1.0		

Table 10.M. Disorders of Musculoskeletal System

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	29	0.7	0.5	1.1
Professional	4,259	18	0.6	0.4	1.1
Technical	2,423	19	1.2	0.7	2.0
Service	1,038	18	2.7	1.6	4.5
Craftsmen and Manual Laborers	1,349	12	1.3	0.7	2.3
Nuclear	1,049	10	1.6	0.8	3.0
Other	555	2	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	108	1.0		

Table 10.N. Symptoms, Signs, and Ill-Defined Conditions

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	17	1.0	0.6	1.8
Professional	4,259	4	0.4	0.1	1.1
Technical	2,423	7	1.1	0.5	2.4
Service	1,038	5	2.0	0.8	5.0
Craftsmen and Manual Laborers	1,349	5	1.5	0.6	4.0
Nuclear	1,049	4	1.6	0.6	4.5
Other	555	2	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	44	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Table 10.0. External Causes of Injury

Occupational Category	Person-Years	# Persons with at Least One Event*	Relative Risk**	Lower 95% Confidence Limit	Upper 95% Confidence Limit
Administration	5,015	84	0.7	0.5	0.9
Professional	4,259	33	0.4	0.3	0.5
Technical	2,423	50	0.9	0.7	1.2
Service	1,038	74	3.2	2.5	4.1
Craftsmen and Manual Laborers	1,349	62	2.2	1.6	2.9
Nuclear	1,049	45	1.9	1.4	2.6
Other	555	2	0.0	0.0	0.0
TOTAL (Reference Group)	15,688	350	1.0		

*Persons with multiple absences during time period counted only once.

**Adjusted for age and gender - compared with all occupational categories.

Deaths Among Active Workers, 1992

During 1992, eight deaths among active workers were reported to the Epidemiologic Surveillance Data Center. Malignant neoplasms were noted for five of the workers. One death was attributed to leukemia, one to breast cancer, another to nasopharyngeal cancer, and two deaths were of unknown primary site. Cardiovascular disease, including myocardial infarction, was mentioned on one report, and one death was attributed to cardiac arrest. There was one death due to external cause of injury.

DIAGNOSTIC CATEGORIES

Category of Diagnoses	ICD-9-CM Code	Types of Illness in Category
All conditions	001-V82	All reported health events.
Infectious and parasitic diseases	001-139	Diseases caused by bacteria, viruses, and parasites.
Malignant neoplasms	140-208, 230-234	All cancers, regardless of the part of the body affected.
Benign neoplasms and neoplasms of uncertain behavior and unspecified nature	210-229, 235-239	Tumors that are not cancerous or that do not exhibit clearly malignant behavior, regardless of the part of the body affected.
Endocrine, nutritional and metabolic diseases, and disorders of the immune system	240-279	Diseases and conditions affecting the hormone secreting glands and organs; nutritional disorders, such as vitamin deficiency; metabolic diseases, such as diabetes and gout; and problems affecting the antibody producing system.
Diseases of the blood and blood-forming organs	280-289	Includes anemia and hemophilia, but excludes leukemia.
Mental disorders	290-319	Psychiatric diagnoses, such as dementia, schizophrenia, depression, and anxiety disorders; alcoholism; drug dependence; and eating disorders, such as bulimia.
Diseases of the nervous system and sense organs	320-389	Diseases affecting the brain, spinal cord, and peripheral nerves. Examples include meningitis; encephalitis; hereditary diseases, such as Huntington's chorea; Alzheimer's and Parkinson's disease; epilepsy; multiple sclerosis; migraine; diseases of the eye, such as cataract and glaucoma; and diseases of the ear, such as conductive hearing loss and otitis.
Diseases of the circulatory system	390-459	Diseases involving the heart, arteries, veins, and lymphatic system. Examples include rheumatic fever, heart murmurs, heart attacks, angina, hardening of the arteries, varicose veins, hemorrhoids, and phlebitis.
Diseases of the respiratory system	460-519	Includes colds, sinusitis, laryngitis, pneumonia and influenza, chronic bronchitis, asthma, and emphysema.
Diseases of the digestive system	520-579	Diseases affecting the teeth and mouth, salivary glands, digestive tract, and the abdominal cavity. Examples include dental abscess, ulcers, appendicitis, hepatitis (excluding viral hepatitis), cirrhosis of the liver, gallstones, pancreatitis, abdominal hernia, and intestinal polyps.
Diseases of the genitourinary system	580-629	Diseases affecting the kidneys, the prostate, and testes; benign breast diseases; infertility (male and female); pelvic inflammatory disease; diseases of the ovary; and menstrual disorders.
Complications of pregnancy, childbirth, and puerperium	630-676	Includes miscarriage; complications of pregnancy, such as hemorrhage; pregnancy-related high blood pressure; pre-eclampsia; premature labor or other complications of labor.
Diseases of the skin and subcutaneous tissue	680-709	Includes acne, cellulitis, sunburn, psoriasis, and seborrhea.
Diseases of the musculoskeletal system and connective tissue	710-739	Includes arthritis, systemic lupus erythematosus, ankylosing spondylitis, herniated intervertebral disc ("slipped disc"), lumbago, sciatica, rheumatism, tendinitis, and osteoporosis.
Congenital anomalies	740-759	Abnormal anatomical development present at birth. Includes spina bifida, cleft palate, harelip, and various chromosomal anomalies, such as Klinefelter's syndrome.
Certain conditions originating in the perinatal period	760-779	Conditions or diseases of the mother that can produce perinatal illness or death of the fetus or newborn. Examples include maternal high blood pressure, maternal malnutrition, ectopic pregnancy, and breech birth. Also includes other conditions originating in the perinatal period, such as fetal malnutrition or slow growth, injuries related to birth trauma, and perinatal jaundice.
Symptoms, signs, and ill-defined conditions	780-799	Symptoms, signs, abnormal results of laboratory or other tests, and conditions for which no specific diagnosis has been made. Examples include blackout, chills, dizziness, fatigue, pallor, abnormal weight loss, undiagnosed chest pain, and heartburn.
Injury and poisoning	800-999	Dislocation of joints; sprains and strains of joints and associated muscles; concussions; bruises; cuts; internal injuries due to crushing, puncture, tearing, or blunt impact; burns; blisters; poisoning; frostbite; heat stroke; and complications of medical or surgical care.
Fractures, all sites	800-829	Cracks or breaks of any bone.
Dislocations	830-839	Separation of a bone from its normal socket or joint.
Sprains and strains of joints and adjacent muscles	840-848	Strains include injuries to muscle from overexertion or from stretching the muscle beyond its normal limit. Sprains include injuries involving tearing or overextending the ligaments of a joint.
Intracranial injuries excluding those with skull fractures	850-854	Includes concussions, internal bruises, and hemorrhages within the skull without a fracture of the bones of the skull.
Internal injuries of the chest, abdomen, and pelvis	860-869	Includes internal injuries to the chest, abdomen, and pelvis and the organs within these areas of the body that do not involve an open wound.
Open wounds	870-897	Includes animal bites, cuts, lacerations, punctures, and amputations, excluding the arteries and veins.
Other injuries and effects of external causes	900-999	Miscellaneous injuries, including injuries to the arteries and veins, problems that occur an extended period of time after the injury has taken place ("late effects"), superficial bruises and abrasions, burns, post-injury shock, poisoning, toxic side effects of chemicals, heat stroke, electrocution, and altitude sickness.
Motor vehicle traffic accidents (external)	E810-E819	Includes accidents involving motor vehicles alone or with other motor vehicles, pedestrians, or vehicles operated by pedals.
Other accidents (external)	E916-E928	Includes accidents involving falling objects or machinery; accidents related to explosions; and those related to electrical current, radiation, hot or corrosive substances, noise, and overexertion.
Supplementary classifications related to personal or family history of disease	V10-V19	Covers situations in which the person is not ill or injured but has a personal or family history of problems, such as cancer, mental illness, allergies, or arthritis, that may affect his or her risk of illness.
Supplementary classifications related to health care for reproduction and child development	V20-V28	Includes problems related to pregnancy, postpartum care, contraception, outcome of delivery, and physical development of child.
Contact with health services for reasons other than illness or injury	V50-V59	Includes care for workers who have been treated previously for an illness or injury that is no longer present but who receive care to complete treatment or prevent recurrence.

GLOSSARY

Adjustment - A mathematical procedure for rates in which the effects of differences (such as age) in groups have been removed. The purpose of adjustment is to allow comparisons between two or more groups.

Epidemiologic Surveillance - The regular and systematic collection of data and interpretation of the distribution of illness, injury, and death in the DOE labor force over time.

ICD-9-CM - The ICD-9-CM (International Classification of Diseases-9th Revision-Clinical Modification) is based on the ICD-9 originally published by the World Health Organization and widely accepted as a standard for the coding of cause of death. The ICD-9-CM is required for the reporting of morbidity to all U.S. Public Health Service programs.

Diagnoses Rate - The number of new, reported health events observed among DOE workers per thousand DOE workers at risk during a given period of time.

STATISTICAL NOTE

The age-adjusted rate was calculated using the 1970 U.S. population. The age-adjusted rate represents the hypothetical rate that would have been observed if the 1992 or 1990-1991 group had the same age distribution as the 1970 U.S. population. The age-adjusted rate is used to compare populations that differ in age. The 1970 U.S. population was selected because it is the standard most used for published morbidity data.

The illness and injury absence rate is defined as an absence due to illness or injury of 21 or more consecutive work days, divided by the total number of workers. OSHA-recordable events may or may not involve an absence from work.

The 95% confidence interval is based on the normal approximation to the binomial distribution where the calculated illness and injury absence rate falls within the interval. The true rate lies within this interval 95% of the time.